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TECHNICAL REPORT

TRANSITION STANDARD (SOFTWARE)

VOLUME I. POLICIES AND PROCEDURES

CDRL A003

TM-HU-534/001/01

19 OCTOBER 1979

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
TM-HU-534/001/01		

4. TITLE (and Subtitle)	5. TYPE OF REPORT & PERIOD COVERED
Transition Standard (Software) Volume I. Policies and Procedures	Technical Report.
	6. PERFORMING ORG. REPORT NUMBER

7. AUTHOR(s)	8. CONTRACT OR GRANT NUMBER(s)
J. V. Cross D. D. Marshall	DAAK40-79-D-0019

9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
System Development Corporation 4810 Bradford Boulevard, N.W. Huntsville, AL 35805	

11. CONTROLLING OFFICE NAME AND ADDRESS	12. REPORT DATE
U. S. Army Missile Command G&C Directorate, Bldg. 5400 ATTN: DRSMI-TGG (R&D), Redstone Arsenal, AL 35809	19 October 1979
	13. NUMBER OF PAGES
	66

14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)	15. SECURITY CLASS. (of this report)
Commander Defense Contract Administration Services Region 9920 South La Cienega Boulevard Inglewood, California 90301	UNCLASSIFIED
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

This document has been approved for public release and sale; its distribution is unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

transition of software
post-deployment software support
configuration management
software maintenance

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This standard provides detailed descriptions of the planning and procedures
required for the transition of computer software and support responsibilities
to the Missile Systems Software Center (MSSC) U. S. Army Missile Command.
Volume I describes the organization, mission, functions, and resources of the
MSSC. Volume II contains two appendices: Appendix A--References and
Appendix B--Glossary.

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TM-HU-534/001/01

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VOLUME I. POLICIES AND PROCEDURES

J. V. Cross
D. D. Marshall

19 October 1979

Contract No. DAAK40-79-D-0019

CDRL A003

PREPARED FOR

MISSILE SYSTEMS SOFTWARE CENTER
GUIDANCE AND CONTROL DIRECTORATE
TECHNOLOGY LABORATORY
U. S. ARMY MISSILE COMMAND
REDSTONE ARSENAL, ALABAMA

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1. INTRODUCTION

1.1 PURPOSE

This standard provides a basic reference for the policies and procedures pertinent to the transition of computer software support from its developer to the Missile Systems Software Center (MSSC), U.S. Army Missile Command (MICOM), Redstone Arsenal (RSA), Huntsville, Alabama. It is intended for use by MSSC personnel to achieve a smooth and successful transfer to the MSSC of computer system software products and support and configuration management responsibility independent of the system involved.

1.2 SCOPE

This standard applies specifically to the transition of computer software and support responsibilities to the MSSC when the MSSC has been designated the post-deployment software support activity for any given system. It applies generally in any case when responsibility for the management of computer programs is being transferred to the MSSC. The standard provides (either directly or by reference) detailed descriptions of the planning required for software transition and the procedures to implement the plans. The responsibilities of key personnel in MSSC are listed.

This standard also provides descriptions of the organization, mission, functions, and resources of the MSSC. The documents used in preparing this standard are also listed. Volume II provides a list of Department of Defense and Army documents applicable to the functions of MSSC, and a glossary of terms and acronyms used in the standard.

1.3 MSSC ORGANIZATION

The current MSSC organization is shown in Figure 1.3-1. The organizational relationships of MSSC are shown in Figure 1.3-2. The organizational titles used in the remainder of the standard are based on an assumption that the organizational relationships change so that the MSSC becomes a separate directorate. Until that change occurs, the standard applies with the following equivalences of titles between those shown in Figure 1.3-1 and those used in the remainder of the document:
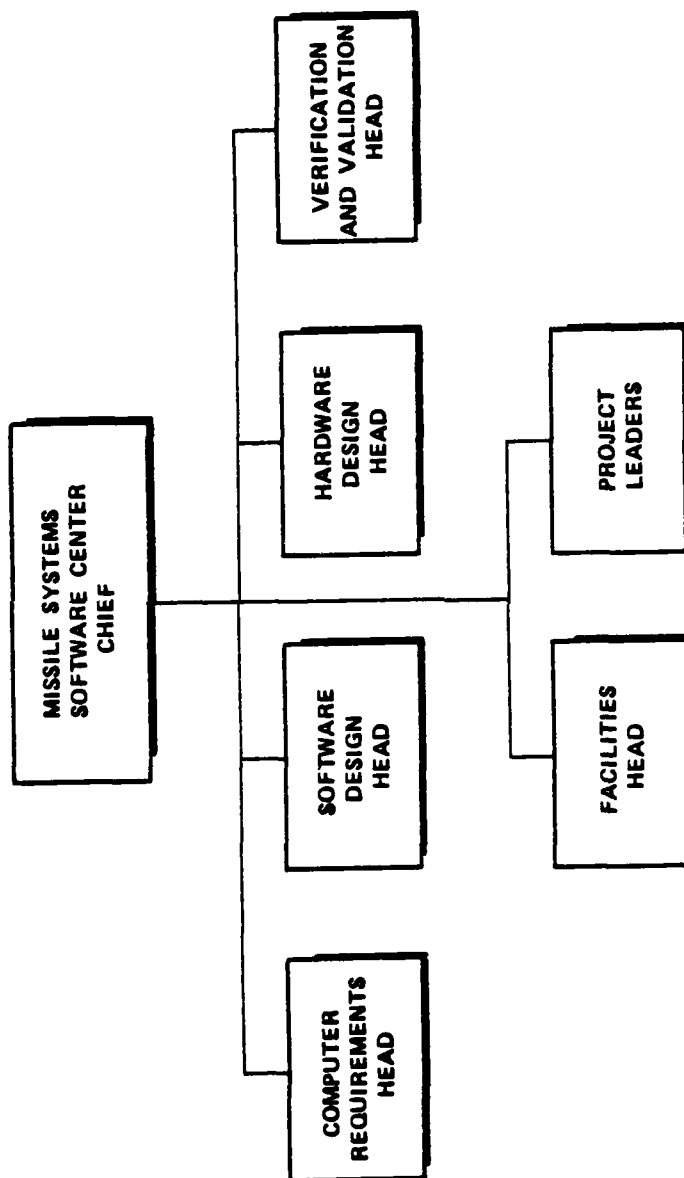
Figure 1.3-1. MSSC Organization

SDC79-073

DEPARTMENT OF THE ARMY

ARMY DEVELOPMENT AND READINESS COMMAND

ARMY MISSILE COMMAND

TECHNOLOGY LABORATORY

GUIDANCE AND CONTROL DIRECTORATE

MISSILE SYSTEMS SOFTWARE CENTER
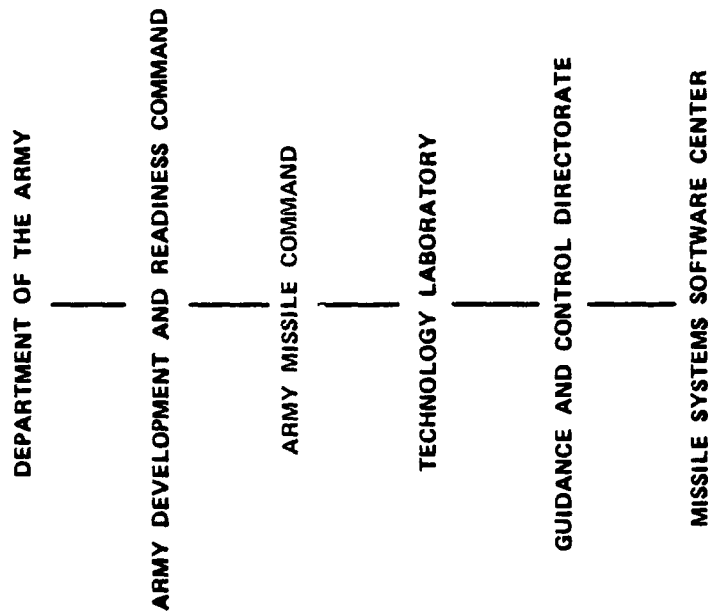
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Figure 1.3-2. Organizational Relationships

Figure	Text
Chief, MSSC	Director, MSSC
Head, (functional area)	Chief, (functional area)
Project Leaders	Project Leaders

1.3.1 Mission

The mission of the MSSC is to support the development and operation of Army missile weapons systems that have embedded computer resources. MSSC accomplishes its mission by:

   a.   Conducting research and development in computer science and data processing technology applied to missile systems; associated command, control and communications; and automatic test equipment.

   b.   Providing technical support to the Missile Command, program managers, and other government activities, in the areas above, and in interoperability engineering for air defense systems.

   c.   Planning and performing post-deployment software support, including development of the necessary support facilities and software tools, for Army missile weapon systems and other Army battlefield automated systems.

1.3.2 Organizational Functions

1.3.2.1 Director Functions

The Director of the MSSC shall:

   a.   Plan, direct, control, and coordinate all activities of assigned technical areas.

   b.   Provide staff assistance to the director of the parent organization and other directors relative to the overall mission.

c.   Participate in the formulation of policy with respect to execution of assigned mission and in the development of future missile systems/component programs.

d.   Provide programming, central administrative, safety, security, training, and central mail control services.

e.   Perform the function of MICOM Lead Laboratory for Automatic Test Equipment (ATE).

f.   Provide Tactical Software Configuration Management function for all MICOM supported programs.

g.   Provide overall management, task development, funding, interface with program managers, consolidation of program reports, technical status reports, funding status, and special studies.

h.   Provide a field office operation at Ft. Bliss to interface with the USAADS agency, to ensure understanding of their requirements of computer-controlled systems.

1.3.2.2 System Analysis Functional Area
The Chief of System Analysis shall:

a.   Perform common functions with respect to test data analysis methodology, modeling, simulation specification, and parametric design relative to partitioning in single systems for tracking, guidance, and control.

b.   Perform missile system research and development at the level compatible with the determination of data processing requirements relative to both inter- and intra-system partitioning to accomplish the tactical specified mission requirements.

c.   Perform parametric analysis in multiple systems relative to functional partitioning; communications; weapon-use optimization through target tracking, sorting, identification, threat analysis, kill assessment, and resource optimization.

d.   Provide the necessary data for determination of the criteria to be used in the verification and validation of requirements integrity relative to the tactical objectives.

e.   Establish the common focal point for the state of the art in parallel and distributed processing for area-wide handling of sensor data to provide support to project managers and advanced development systems to accomplish precision acquisition, tracking, identification and, where applicable, pointing for the purpose of engagement.

f.   Specify the necessary configuration of hardware and software facility to develop data processing requirements for any unique system.

1.3.2.3 Computer Hardware Engineering Functional Area
The Chief of Computer Hardware Engineering shall:

a.   Perform common functions with respect to embedded digital computer hardware in on-board missile guidance and control systems, in fire control systems, in ground support systems (missile launch, automatic test equipment, missile guidance) and in command, control and communication systems.

b.   Maintain an expert technology base as the Army focal point for all such embedded missile computer hardware capabilities.

c.   Apply advanced component technology to specific missile system requirements via design, fabrication and test of advanced missile computers and via demonstration of the advanced missile computer hardware to potential missile system users.

d.   Provide testbed computer systems to support activities in the hardware development area as well as all other activities within the Laboratory.

e.   Design, implement and maintain maintenance and diagnostic (M&D) hardware and software for post deployment systems assigned to the Laboratory.

f.   Design and implement M&D software for missile system Automatic Test Equipment where necessary to supplement the High Order Language functions performed by the Software Engineering Functional Area.

1.3.2.4   Software Engineering Functional Area
The Chief of Software Engineering shall:

a.   Perform common functions with respect to embedded and support computer software components and systems involving analysis, design, development, exploitation, evaluation, implementation, testing, and maintenance of software system architecture, operating systems, executives, data bases, modules, subprograms, and code sequences.

b.   Develop and maintain Laboratory and MICOM standards for embedded and support computer software engineering practices.

c.   Provide MICOM focal point for tactical and automatic test equipment, high-order languages, and configuration control.

d.   Develop software design facilities and automated support systems to increase the effectiveness of developing software systems.

e.   Provide a technology base and advance the technology in the areas of software management techniques, design techniques, reliability, quality assurance, correctness, configuration management, and maintainability.

1.3.2.5   Verification and Validation (V&V) Functional Area
The Chief of Verification and Validation shall:

a.   Perform common functions with respect to software V&V (system require-
ments verification, software requirements verification, design verification,
program code verification and software/system validation) of Army weapon system
computer programs.

b.   Develop software V&V management plans, test plans, test procedures,
test reports, V&V software configuration control plans, and V&V methodology in
support of V&V assignments.

c.   Design, develop, and maintain software test tools (emulation, simula-
tion, computer hardware test stand, data collection software, data reduction
software, and automatic data analysis software) for accomplishment of V&V
software testing and performance analysis.

d.   Develop schemes and methodologies for compiling software error
statistics that are pertinent to the improvement of software quality and reliabi-
lity through enhanced software development and software V&V processes.

e.   Serve as MICOM representative in Army/DoD formulation and improvement
of software documentation standards, software quality assurance standards,
software acceptance testing standards, and other software related policies.

f.   Provide to project managers technical support in computer resource
management planning, softwa.e configuration control, software management reviews,
and evaluation of software performance during flight test programs.

g.   Provide and maintain testbed facilities for maintenance and V&V of
tactical software of Army weapon systems in the post-deployment period.

1.3.2.6 Facilities and Operations Functional Area
The Chief of Facilities and Operations shall:

   a.   Establish and maintain procedures for utilization and operation of the computer operations, including keypunch, plotters, computers, and reproduction facilities.

   b.   Generate annually a Memorandum of Understanding (MOU) to staff required computer operations.

   c.   Provide the required maintenance for computers, peripherals, telephones, test equipment, furniture, heating, air conditioning, buildings, and grounds.

   d.   Interface with RASA, Facilities Engineering, Communications, Calibration, Photo Laboratory, Publications, Shipping and Receiving, Furniture Repair, and MICOM Management Operations for acquisition of required services.

   e.   Process purchase requisitions for materials, parts, supplies, forms, and services.

   f.   Maintain records of distribution of supplies and their status, forms control, and equipment inventory.

   g.   Develop the approval and justification data required for ADPE requisitions.

   h.   Establish and maintain the security and safety requirements for the facilities and personnel.

   i.   Distribute incoming mail, supplies, and equipment.

   j.   Process all off-post shipments and incoming shipments through proper channels.

1.3.2.7 Common Functions

Chiefs of System Analysis, Computer Hardware Engineering, Software Engineering,
and Verification and Validation shall perform the following common functions
with respect to those areas listed in the respective functional area descrip-
tions:

    a.   Plan and conduct a program of research, development, and engineering
in assigned technical mission area independently or in conjunction with other
functional activities.

    b.   Establish and maintain a technological base to ensure timely and
effective application of functional area technology to all types of Army missile
systems and ancillary equipment.

    c.   Perform detailed analysis, experiments, and simulations within assigned
functional area.

    d.   Perform engineering functions with respect to application of digital
computer components and subsystems, both hardware and software, within the
assigned technology area to all types of Army missile systems and ancillary
equipment.

    e.   Maintain cognizance of those project managed efforts that make use of
the assigned technology, particularly during early stages of system development,
and conduct a program of analysis, experimentation, and simulation within the
functional area, which will permit timely and effective identification of
technical difficulties, and will serve as a basis for technical advice to the
project manager.

    f.   Maintain a program to develop, identify, and prove by field demonstra-
tion potential design or fabrication improvements to developed weapon systems.
Include hardware-in-the-loop simulation utilizing experimental devices, experi-
mental systems design, equipment problem diagnosis, data collection and analysis,
and technological exploration, as well as laboratory and field tests.

g.   Utilize empirical and analytic techniques for subsystem identification, modeling, and model validation.

h.   Develop and utilize detailed dynamic simulations incorporating analog, digital, and hybrid techniques associated with computer hardware and physical devices for kinematic and signature modeling.

i.   Perform analytic and physical integration of computer systems into experimental configurations of missiles, fire control, command and control, and related ancillary equipment. Perform related parametric and evaluation activities.

j.   Perform field evaluation of computer hardware and software, related systems, related data acquisition techniques, and pre- and post-test diagnoses.

k.   Perform identification, modeling, and design for external phenomena that interact with specific computer systems such as EMI, countermeasures, target signatures, data rates, etc.

l.   Develop methods for statistical combination of performance data and parameters that determine probabilities of mission initiation, mission completion, miss distance, system overloads, or other such probabilistic measures for inputs to lethality determination, war games, and decision analysis.

m.   Identify the interaction of computer systems with ancillary or shared systems; e.g., pointing and tracking, laying and aiming, seekers, inertial measurement systems, actuators, radars, displays, data links, stimuli and measurement, and other similar systems.

n.   Develop and design selected ancillary systems of hardware and software that employ basic computer technology or intimately interact with the computer system, such as major portions of fire control, navigation, displays, data links, etc.

o.   Conduct research and development of exploratory and advanced develop-
ment projects for advanced concepts to meet embedded and support computer
system requirements.

p.   Plan, develop, conduct, and supervise analysis programs or studies to
establish the feasibility of embedded and support computer system requirements
and adequacy of design.

q.   Design embedded and support computer hardware and software in assigned
specialty area.

r.   Develop and evaluate embedded and support computer system requirements
in specialty area to determine technical feasibility and functional adequacy
for current and future systems.

s.   Establish and provide technical and test requirements, specifications,
acceptance criteria, and measuring programs consistent with design criteria;
evaluate reduced test data.

t.   Assure timely consideration and integration of latest technological
advances and military materiel requirements as these factors relate to and
influence the execution of assigned tasks.

u.   Provide technical consultation and participate in studies to determine
technical feasibility of new component system concepts and requirements.
Coordinate with in-house laboratory elements as appropriate. Furnish progress
reports on current work as required.

v.   Prepare contractual requirements, assist in evaluating contract
proposals for technical adequacy and optimum cost objectives, and exercise
technical supervision of contractor performance in assigned technical areas.
Review contract analysis and designs.

w.   Assure proper influence is directed toward safety, reliability, human
engineering, product assurance, manufacturing methods and technology, and value
engineering in assigned technical area.

x.   Serve as a focal point in assigned technical area and maintain direct
and continuing technical liaison with other government laboratories and agencies,
contractors, and universities.

y.   Conduct programs to advance technology in assigned technical specialty
areas.

z.   Maintain a technology forecast that will serve as the basis for
research and development activities.

1.4 MSSC RESOURCES

This subsection of the standard provides lists of currently authorized resources
at the MMSC for use by planners in estimating needs for additional resources
to provide support functions.

1.4.1 Personnel

The MSSC's current authorization for personnel is as follows:

Table of Distribution and Allowances	51
Other Government	8
TOTAL	59

1.4.2 Computers

The following computers and peripherals comprise the current assets of MMSC
(program-peculiar equipment is not included):

a.   UNIVAC 1108

    3   drum drives, UNIVAC 432

    1   drum drive, UNIVAC 1782

    2   drum drives, UNIVAC FASTRAND

    3   drum controllers

    8   tape drives, 7-track

    2   tape drives, 9-track

    2   tape controllers

    4   AMPEX memory units

    1   high speed printer

    1   high speed printer controller

    2   line printers, UNIVAC 1004

    2   card readers, UNIVAC 1004

    1   card punch, UNIVAC

    1   DEMAND terminal

    1   offline drum plotter, 30 in., Zeta

    1   offline keypunch, IBM 129

    1   offline tape certifier/degausser

b.   Raytheon 520

    1   disc drive, CDC

    5   tape drives

    1   card reader/punch

    1   paper tape reader

    1   plotter, CalComp

    1   graphics terminal, Tektronix

    1   hardcopy unit

    1   general purpose interface to tactical units, 8 ports

c.   Hewlett Packard HP 2100S

    1   disc drive, HP 7900

    1   line printer, HP 2767A

    1   card reader, HP 2892A

      1   paper tape reader

      1   paper tape punch

      1   plotter, HP 7210A

      1   tape drive, master, HP 7970E

      1   tape drive, slave, HP 7970E

      1   CRT console, HP 2600

d.   ROLM 1602 Rugged Nova

      1   disc drive, fixed head

      1   direct memory access

      1   line printer

      1   paper tape reader/punch

      1   storage display terminal, Tektronix

      1   expansion chassis, 11 slots

e.   Intel INTELLEC MDS-230

      Microprocessor Development System

      1   dual floppy disc drive

      1   printer

      1   CRT terminal

      1   memory, 16K

      1   in-circuit emulator for Intel 8086, ICE-86

1.4.3 Support Software

The following general-purpose support software is available for use on the
named computer (program-peculiar software is not listed):

a.   UNIVAC 1108

      ASCII FORTRAN, UP 8244

      FORTRAN V, UP 7876

      Assembler (FIELDATA), UP 4040

      EXEC 8 JOVIAL, UP 7698

      Am. Std. COBOL (FIELDATA), UP 7845

ALGOL, UP 7544

Sort/Merge (Stand Alone), UP 8033

EXEC 8 (PATRIOT modified)

b. Raytheon 520

Disc operating system

Overlay loader

Source editor and update system

Tape dump

Real-time graphics system

Interactive simulation control system

Interactive remote computer controller

Six-degree-of-freedom simulation (general)

Structured FORTRAN preprocessor

Structured FORTRAN flow charter

Interactive telemetry analysis system

Fast Fourier Transform and Inverse Fast Fourier Transform

On-line CalComp plotter and CRT plotter program

Digital filter frequency response analyzer

Floating-point and fixed-point FORTRAN truncation program

c. Hewlett Packard HP 2100S

DOS II disc operating system

RTE II disc operating system

FORTRAN

Structured FORTRAN preprocessor

HP diagnostics package

All support packages supplied with DOS II and RTE II

d. ROLM 1602 Rugged Nova

Data General DOS operating system with utility and support software

FORTRAN

BASIC

ROLM diagnostics package

e.   INTELLEC MDS-230

       ISIS-II disc operating system

       PLM-86 compiler

       Assembler for Intel 8080, 8085, 8086

       Intel utility and support software for ISIS-II

1.4.4 Facilities

The MSSC presently occupies the following buildings on Redstone Arsenal, Alabama:

Building No.	Square Feet	Use
4373	12,500	Raised-floor computer laboratory
4373A	4,500	Office space
4381	3,500	Office space
5400	3,500	Borrowed office space

Building 4373A is attached to 4373; 4381 is ½ mile from 4373; 5400 is 2 miles from 4373 (Missile Systems Software Center Project Development Brochure PDB-I).

2. APPLICABLE DOCUMENTS

This section lists documents used in the development of the standard or called as references in the body of the standard.

MIL-S-83490	Specifications, Types and Forms
MIL-STD-483	Configuration Management Practices for Systems, Equipment, Munitions and Computer Programs
MIL-STD-490	Specification Practices
DODD 4105.55	Selection and Acquisition of ADP Resources
DODD 4160.19	Department of Defense Automatic Data Processing Equipment Reutilization Program
DODD 5000.29	Management of Computer Resources in Major Defense Systems
DODD 5010.19	Configuration Management
DODD 5100.40	Responsibility for the Administration of the DOD Automatic Data Processing Program
DA PAM 11-25	Life Cycle System Management Model for Army Systems
AR 37-100	The Army Accounting Classification Structure
AR 37-112	Management Accounting for the RDTE Appropriation
AR 37-120	Procurement of Equipment and Missiles, Army
AR 70-XX	Management of Computer Resources in Army Battlefield Automated Systems
AR 70-6	Management of the Army Research, Development, Test, and Evaluation Appropriation
AR 70-10	Test and Evaluation During Development and Acquisition of Materiel
AR 70-17	System/Program/Project/Product Management
AR 70-37 DARCOM SUPP 1 MIRADCOM SUPP 1 (J)	Configuration Management

AR 100-127   Integrated Logistic Support

AR 1000-1   Basic Policies for Systems Acquisition

DARCOM-C 702-4   Army Defense Systems Software Control
                         During the Production and Deployment
                         Phase

DARCOM-R 11-27   Life Cycle Management of DARCOM Materiel

DARCOM-R 70-16   Management of Computer Resources in Battlefield
                         Automated Systems

                         Missile Systems Software Center Project Develop-
                         ment Brochure PDB-I

                         Post-Deployment Software Support (PDSS) Study/
                         Management Plan, Revised Draft June, 1979

3. <u>REQUIREMENTS</u>

This section presents the requirements for the planning and for the process of software transition.

3.1 ASSIGNMENT OF SOFTWARE SUPPORT RESPONSIBILITIES

The planning and procedures described in this standard shall be performed in anticipation of and in response to assignment of post-deployment software support responsibilities for a specific system to MSSC by appropriate authority. The need to anticipate the formal assignment of responsibilities is explained as follows. The life cycle management model (DA PAM 11-25 and DARCOM-R 11-27) provides for the beginning of planning for transition and post-deployment software support early in the phase of exploration of alternative system concepts. But the assignment of post-deployment support responsibilities is not detailed in the life cycle management model, and the evolving Army policy for management of embedded computer resources (AR 70-XX, DARCOM-R 70-16) allows designation of the post-deployment software support activity as late as the end of the demonstration and validation phase. By that time, many decisions affecting post-deployment software support will have been made, possibly without information from those who will provide the support. Therefore, it will be necessary to anticipate assignment of software support responsibilities through analysis of all available information and the application of judgment and experience.

3.2 PLANNING

The objectives of transition planning at MSSC are to maximize the probability of successfully accomplishing post-deployment software support for all assigned missile systems, and to do so within the authorized budgets. The accomplishment of the objectives will depend on the quality of the computer programs to be supported and their identifying and supporting documentation; the quantity and quality of MSSC personnel assigned to the support tasks; and the quality and availability of the support systems with which they will work. To ensure adequacy of these basic ingredients of the post-deployment software support center, the following elements of planning should be influenced by MSSC requirements as early as possible and throughout the life cycles of the systems to be supported at MSSC:

a.   Computer programming quality

b.   Technical data quality

c.   Configuration management

d.   Funding for post-deployment software support facilities, support
systems, tactical system testbed, and personnel

e.   Training of support personnel.

The remainder of this section details the planning actions to be taken by MSSC
in each life cycle phase.

3.2.1 Milestone 0 - Exploration of Alternative System Concepts

Milestone 0 for major programs is the approval of the Mission Element Needs
Statement (MENS) and the decision by the Secretary of Defense to initiate a
development program. This milestone marks the beginning of the exploration of
alternative system concepts. For nonmajor systems, this milestone is not
clearly defined. The exploration of alternative systems concepts occurs in
the course of exploratory and advanced development. The following paragraphs
describe system acquisition actions relevant to software transition that are
taken during this phase and the MSSC actions necessary to promote the objectives
of this standard. Where applicable, the DARCOM Life Cycle Management Model
(LCMM) block number is given (DARCOM-R 11-27).

3.2.1.1 Program Management Actions

During this phase, the following actions relevant to software transition will
be taken by DARCOM staff, a Special Task Force (STF), a Special Study Group
(SSG), a materiel developer, or a Program/Project/Product Manager (PM):

a.   Life cycle management planning begins in DARCOM staff. Includes
plans for post-deployment software support and program transition. Leads to
first Outline Development Plan (DARCOM LCMM 111).

b.   PM is appointed and PM office is established (DARCOM LCMM 151). PM will retain responsibility for the system throughout its life cycle. He is charged with seeing that support planning proceeds in phase with the system development and production.

c.   The functional configuration identification is developed by the materiel developer in coordination with the combat developer (DARCOM LCMM 162). This system specification is the basis for the Outline Development Plan and will become the functional baseline. The functional baseline will be established when the system specification is approved.

d.   Configuration management begins when the functional baseline is established.

e.   The Test Integration Working Group is formed to develop the Coordinated Test Program (CTP) (DARCOM LCMM 173). The group is comprised of representatives of PM or materiel developer, combat developer (usually TRADOC), development and operational testers, a logistician, and contractors. The CTP becomes a part of the Outline Development Plan.

f.   The draft Defense Coordinating Paper (DCP), Defense Program Memorandum (DPM), or Army Program Memorandum (APM) as required by OSD or DA is prepared by the materiel developer, PM, or STF. It is coordinated with TRADOC, DARCOM, and DA, and becomes a part of the Outline Development Plan (DARCOM LCMM 182).

g.   The Outline Development Plan is prepared by the materiel developer or the PM, constituting the Army Acquisition Plan (DARCOM LCMM 186).

3.2.1.2 MSSC Actions

To promote the objectives, MSSC personnel (assigned in Section 4) shall take the following actions through the appropriate authorities during this phase:

a.   Maintain awareness of missile systems entering the Exploration of
Alternative System Concepts.

b.   Identify and establish contact with DARCOM staff member responsible
for the program. Ensure his familiarity with software transition, post-
deployment software support, and MSSC capabilities.

c.   Recommend items for consideration and provide facts for initial
transition and post-deployment software support planning.

d.   When PM is appointed, establish contact and ensure his familiarity
with software transition, post-deployment software support, and MSSC capabili-
ties.

e.   Recommend early involvement of MSSC as advisor on computer resources,
and in validation and verification role. This will contribute to MSSC readiness
to assume software support responsibilities.

f.   Advise PM on need for a quality functional baseline prepared in
accordance with MIL-STD-490 and MIL-S-83490.

g.   Make recommendations to Test Integrated Working Group for inclusion
in the CTP, promoting test methods that will assure the quality of the delivered
computer programs.

h.   Provide information on computer resource implications and risks to
be documented in the DCP/DPM/APM.

3.2.2 Milestone I - Demonstration and Validation
At Milestone I, the DCP/DPM/APM and ODP are reviewed for approval to proceed
to the demonstration and validation of selected systems concepts, or in some
cases to full-scale engineering development (AR 1000-1). The following questions
will be asked of the materiel developer or PM during the Milestone I reviews
(DARCOM-R 70-16):

a.   Will post-deployment support be performed by the government or a
contractor?

b.   When will the post-deployment support activity be designated?

c.   Who is the post-deployment support activity?

d.   How will support requirements be determined?

The review includes the functional configuration identification document.
Upon approval, the functional baseline is established and placed under
configuration management. The following paragraphs assume that the optional
demonstration and validation phase has been approved.

3.2.2.1 Program Management Actions
During this phase, the following actions relevant to software transition
will be taken by the materiel developer or PM:

a.   Beginning agreements for transition and support (Memorandum of
Understanding, interservice support agreements, DD Form 114 support agreements)
(DARCOM LCMM 217). These become part of the Development Plan.

b.   Computer Resources Working Group established to aid in management
of computer resources. Comprised of materiel developer, combat developer,
development and operational testers, and designated post-deployment software
support activities (DARCOM-R 70-16).

c.   Computer Resource Management Plan (CRMP) developed (DODD 5000.29,
AR 70-XX, DARCOM-R 70-16, DARCOM-C 702-4). Materiel developer prepares CRMP
and coordinates with combat developer, development and operational testers,
and designated post-deployment support activities. The CRMP becomes a part
of the Development Plan.

d.   The Outline Development Plan is updated by the materiel developer with new information from all contributors. The ODP evolves into a Development Plan later in this phase (DARCOM LCMM 253).

e.   Test Integrated Working Group udpates the Coordinated Test Plan in preparation for Development Test I (DT-I) and Operational Test I (OT-I) (DARCOM LCMM 267).

f.   Special Task Force/Special Study Group/PM may be named if not done in earlier phase (DARCOM LCMM 296, 297).

g.   Detailed Post-Deployment Software Support Plan is prepared (PDSS Study/Management Plan). PDSS activities are identified (DARCOM-R 70-16).

h.   Detailed configuration management planning is performed (DODD 5010.19).

i.   Test Integrated Working Group revises Coordinated Test Plan to reflect DT-I/OT-I results and to prepare for DT-II/OT-II (DARCOM LCMM 343).

j.   The allocated configuration identification is developed by the materiel developer for configuration items that are parts of higher-level configuration items (DARCOM LCMM 357). Computer program development specifications are used for those functions allocated to software.

k.   The Development Plan is prepared based on the Outline Development Plan (DARCOM LCMM 373). It incorporates the CRMP as an annex (AR 70-XX, DARCOM-R 70-16, DARCOM-C 702-4).

l.   The DCP/DPM/APM are updated (DARCOM LCMM 376).

3.2.2.2 MSSC Actions

To promote the objectives, the MSSC personnel assigned responsibilities in
Section 4 shall take the following actions through the appropriate authorities
during this phase:

   a. Provide information to the materiel developer or PM to include in
support agreements and memoranda of understanding as required. This information
is intended to promote adequate understanding of capabilities, limitations, and
responsibilities of all parties in transition and post-deployment software
support.

   b. Attend all sessions of the Computer Resources Working Group. Provide
technical leadership in the management of computer resources.

   c. Actively seek the leadership in development of the Computer Resources
Management Plan (3.2.6). Ensure that the plan stresses the points essential to
successful transition and post-deployment software support (3.2).

   d. Contribute to the update of the Outline Development Plan by providing
plans and requirements for training of support personnel, for support software,
facilities and equipment, and for transition of software.

   e. Make recommendations to Test Integrated Working Group for inclusion
in the final Coordinated Test Plan for DT-I/OT-I, promoting test methods that
will assure the quality of the delivered computer programs.

   f. If not accomplished in earlier phase, identify and establish contact
with materiel developer or PM to ensure his awareness of software transition,
post-deployment software support, and MSSC capabilities.

   g. Actively seek the lead in preparing the Post-Deployment Software
Support Plan (3.2.7) and the assignment of PDSS responsibilities to the MSSC.

h.   Maintain awareness of the Configuration Management Plan (3.2.9).
Contribute to its preparation to ensure adequate plans for the management of
computer programs during development, deployment, transition, and operation.

i.   Review the test reports from DT-I/OT-I. Make recommendations to the
Test Integrated Working Group for inclusion in the update of the CTP in prepara-
tion for DT-II/OT-II.

j.   Advise PM on the need for quality in the allocated configuration
identification. Promote the identification of computer program configuration
items documented by Computer Program Configuration Item Specifications (Part I-
B5 Computer Program Development Specification and Part II - C5 Computer Program
Product Specification) in accordance with MIL-STD-483 and MIL-STD-490 (AR 70-
37, DARCOM SUPP 1).

k.   Ensure the readiness of the Computer Resources Management Plan for
annexation to the Development Plan. The CRMP shall include details of transition
planning and post-deployment support planning.

l.   Provide information to update the DCP/DPM/APM in the areas related to
support facilities requirements.

3.2.3 Milestone II - Full Scale Engineering Development

The materiel developer or PM will recommend that the system advance to full-
scale engineering development when primarily engineering development rather
than advanced development is required. The following questions will be asked
of the materiel developer or PM during the Milestone II reviews, in addition to
those previously asked at the Milestone I reviews (DARCOM-R 70-16).

a.   What steps have been planned for software turnover from contractor to
the government?

b.   Were personnel requirements for supporting computer resources deter-
mined?

c.   What software support items will be required for maintenance of the
system?

d.   Are they specified as deliverables?

e.   How will the PM provide for maintenance support requirements?

f.   How will the software be supported in the field?

g.   What hardware and software will be needed at the software support
facility?

h.   How will it be procured?

The Milestone II review includes the allocated configuration identification.
Upon approval, the allocated baseline is established and placed under configura-
tion management. The full-scale engineering development phase begins when the
DCP/DPM/APM as approved, or on approval of the Validation In-Process Review
positive results.

3.2.3.1 Program Management Actions
During full-scale engineering development, the following actions relevant to
software transition will be taken by the materiel developer or PM:

a.   A Transition Planning and Tracking Group (PTG) is established no
later than 60 days after an affirmative Milestone II decision. The PTG will
plan and monitor the transition process (DARCOM-R 70-1) (DARCOM LCMM 409).

b.   The basic structure of the Transition Plan is completed no later than
120 days after establishment of the PTG. The transition date is established
(DARCOM LCMM 411).

c.   Facilities requirements are reviewed (DARCOM LCMM 413).

d.   Agreements and memoranda of understanding are reviewed (DARCOM LCMM 415).

e.   The Coordinated Test Program is revised and updated for DT-II/OT-II by the Test Integrated Working Group, with contractor participation (DARCOM LCMM 412, 463, 468, 477).

f.   The Development Plan is updated (DARCOM LCMM 484).

g.   The validation plan for draft technical publications is prepared (DARCOM LCMM 487).

h.   Functional Configuration Audit and Physical Configuration Audit begin, and will continue throughout the test cycle (DARCOM LCMM 521).

i.   The product configuration identification is established with "build-to" detailed specifications that include provisions for acceptance tests (DARCOM LCMM 558).

j.   The progress and scheduling of transition is reviewed (DARCOM LCMM 587).

k.   The Computer Resources Management Plan is updated (DARCOM-R 70-16).

l.   The Development Plan is updated (DARCOM LCMM 588).

m.   The DCP/DPM/APM is revised (DARCOM LCMM 589).

n.   Simple systems transition from development to readiness management, if criteria of DARCOM-R 70-1 have been met (DARCOM LCMM 598).

3.2.3.2 MSSC Actions

To promote the objectives, MSSC personnel assigned responsibilities in Section 4 shall take the following actions through the appropriate authorities during this phase.

a.   Assign a member of the Transition Planning and Tracking Group upon
its establishment, to participate in all activities of the PTG and to take the
lead in developing the transition plan.

b.   Lead the development of the transition plan (3.2.8), and ensure
selection of a realistic transition date. If the post-deployment software
support activity has not been named, recommend that MSSC be designated so that
detailed planning can proceed. Ensure consideration is given to the preparations
for turnover of computer resources to the MSSC.

c.   Review MSSC requirements for facilities, equipment, support software,
personnel, and training, and ensure management awareness of the requirements
and the status of their acquisition.

d.   Review and recommend revisions or additions to memoranda of under-
standing and support agreements related to transition and post-deployment
software support.

e.   Make recommendations to the Test Integrated Working Group for use in
the Coordinated Test Program to promote quality in the delivered computer
programs.

f.   Contribute to the updating of the Development Plan with plans for
transition and post-deployment support of software and the requirements of
those plans.

g.   Seek an active role in the validation of system documentation to
ensure the quality required in computer resource documents to be used in
accepting and supporting the computer programs.

h.   Similarly seek an active role in the functional configuration audits
and physical configuration audits of computer resources.

i.   Advise the PM on the need for quality in the product configuration
identification. Promote the requirement that the PCI documents must be Computer

Program Configuration Item specifications, Part II-Computer Program Product
specifications, prepared in accordance with MIL-STD-483, MIL-STD-490, and MIL-
S-83490 (AR 70-37 DARCOM SUPP 1).

j.   Lead the PTG in providing management visibility into the progress of
transition. Perform MSSC transition planning and preparation functions in
accordance with the transition plan and the transition process defined in this
standard (3.3).

k.   Lead the updating of the Computer Resources Management Plan, incor-
porating information from other contributors, and adding or changing information
related to transition or software support.

l.   Provide information to the PM for updating the Development Plan in
preparation for the production decision.

m.   Provide information to the PM for updating the APM/DPM/DCP in prepara-
tion for the production decision.

n.   If transition occurs at this point, perform the transition process in
accordance with the transition plan and Section 3.3 of this standard.

3.2.4 Milestone III - Production
This milestone represents the decision whether to commit to production and
deployment of the system. At the formal reviews, the following questions
related to transition and software support may be asked of the PM (AR 70-xx):

a.   When will software turnover from contractor to government occur?

b.   What steps have to take place before the turnover?

c.   What activity will provide post-deployment software support?

    d.   What items will be required in the post-deployment software support center?

    e.   How will changes to the baseline software be handled?

In conformance with the DARCOM Life Cycle Management Model (DARCOM-R 11-27), an operational and disposal phase is treated separately in this standard (3.2.5).

3.2.4.1 Program Management Actions

During production, the following actions relevant to software transition and support will be taken by the materiel developer or PM:

    a.   The transition plan, memoranda of understanding, and support agreements are reviewed (DARCOM LCMM 611).

    b.   The Coordinated Test Program is updated for DT-III/OT-III by the Test Integrated Working Group (DARCOM LCMM 626).

    c.   If low-rate initial production has been elected, the Development Plan is updated prior to beginning DT-III/OT-III (DARCOM LCMM 627).

    d.   The Post-Deployment Software Support Plan is reviewed and updated.

    e.   Field facilities are acquired, prior to fielding of the first production unit (DARCOM LCMM 656). This includes the post-deployment software support center requirements for hardware, support software, documentation, and staff (DARCOM-C 702-4).

    f.   Functional Configuration Audit and Physical Configuration Audit are conducted (DARCOM LCMM 662). Product baseline is established (DARCOM LCMM 663).

    g.   The Development Plan and APM/DPM/DCP are updated and submitted for formal reviews of programs in low-rate initial production (DARCOM LCMM 717

through 737). This is a repeat of Milestone III seeking approval for full
production.

h.   Transition occurs for some systems (DARCOM LCMM 738).

i.   Final training planning is accomplished (DARCOM LCMM 747).

j.   Resident training is initiated (DARCOM LCMM 781).

k.   Product Acceptance Test and Evaluation (PAT&E) is conducted (DARCOM
LCMM 787).

l.   Initial Operational Capability is attained (DARCOM LCMM 799).

3.2.4.2 MSSC Actions

To promote the objectives, MSSC personnel assigned responsibilities in Section 4
shall take the following actions through the appropriate authorities during
this phase:

a.   Lead the review and updating of the unexecuted transition plan.
Recommend revisions or additions to memoranda of understanding and support
agreements related to transition and post-deployment software support.

b.   Review the results of DT-II/OT-II. Make recommendations to the Test
Integrated Working Group for use in the Coordinated Test Program to promote
quality in the delivered computer programs.

c.   Contribute to the updating of the Development Plan if any changes to
transition plans or support plans have occurred.

d.   Lead the review and updating of the Post-Deployment Software Support
Plan.

e.   Monitor the acquisition of required resources for the post-deployment
software support center. Advise the materiel developer.

f.   Continue an active role in the functional configuration audit and
physical audit to ensure that the software end products to be supported are of
high quality.

g.   Contribute to the preparation of the Development Plan and APM/DPM/DCP
for the full-production decisions.

h.   If transition occurs at this point, perform the transition process in
accordance with the transition plan and Section 3.3 of this standard.

i.   Provide training requirements for MSSC personnel for consideration in
the final planning for training. Obtain and consider descriptions of various
training courses available for long-term maintenance of skills and career
advancement of MSSC personnel assigned to the post-deployment support functions.

j.   Plan for assignment of specific persons early enough to obtain spaces
in the earliest available training.

k.   Seek the authority to observe PAT&E of computer resources. Review
the results of PAT&E to ensure the acceptability of computer programs.

l.   Prior to IOC, review all plans and evaluate MSSC readiness to accept
software and commence post-deployment software support. Ensure instructions
for submittal of software error reports have been tested and promulgated.

3.2.5 Operational Phase

During this phase the system has been deployed to military units for unit
training. Production continues until the authorized level has been reached.

3.2.5.1 Program Management Actions

The following actions relative to transition and planning for post-deployment
software support will be taken by the materiel developer or PM:

a.   Authorize transition (DARCOM LCMM 801). This is the normal place in the life cycle for complex systems to undergo transition.

b.   Commence post-deployment evaluations of changes in threat conditions, interfacing systems, and doctrine, and suggestions and reports from users that might lead to product improvement programs (DARCOM LCMM 846), modifications (DARCOM LCMM 851), or continuing support (DARCOM LCMM 876).

3.2.5.2 MSSC Actions

To complete the objectives, MSSC personnel assigned responsibilities in Section 4 shall take the actions called for in the transition plan and in Section 3.3, and commence post-deployment software support in accordance with the post-deployment support plan.

3.2.6 Computer Resources Management Plan (CRMP)

The CRMP is described in detail in DoD Directive 5000.29, AR 70-xx, DARCOM-R 70-16, and DARCOM-C 702-4. It is intended that the CRMP compile the materiel developer's policies for computer resource management during development, acquisition, deployment, and support. The DoD policy requiring CRMP is not applicable to general purpose, commercially available ADP assets as defined in DoD Directives 4105.55, 4160.19 and 5100.40. A minimum outline for the CRMP is (DARCOM-R 70-16):

Section 1. General

Section 2. Program Management

Section 3. Acquisition Management

Section 4. Development Management

Section 5. Coordinated Test Program Management

Section 6. Plan for Support

The following subparagraphs provide brief descriptions of the contents of the CRMP that are related to transition and post-deployment software support.

3.2.6.1 Section 2 - Program Management

This section of the CRMP is prepared by the materiel developer as soon as it is recognized that computer resources will be required. The following topics shall be included:

    a.   Identification of computer resources support requirements for government-funded equipment and facilities.

    b.   Plans for modification and maintenance of computer software.

    c.   Plans for the acquisition of support equipment, including justification for the equipment.

    d.   Estimates of the resources required and the risks associated with computer program support throughout the system life cycle.

3.2.6.2 Section 3 - Acquisition Management

The materiel developer prepares this section during the development and validation phase, and coordinates it with the combat developer, development and operational testers and the designated post-deployment support activities. The following topics shall be included:

    a.   Management planning for support.

    b.   The support concept.

    c.   Life cycle management of computer resource documentation, including requirements for computer program and data rights, and support of the documentation.

    d.   Support facility requirements.

    e.   Configuration management concepts.

    f.   Criteria for transfer of program management responsibility and for system turnover and support.

3.2.6.3   Section 4 - Development Management

The materiel developer or the development contractor prepares this section of the CRMP during the demonstration and validation phase. The following topics shall be included:

    a.   Procedures for reporting and correcting computer program errors and deficiencies during their development and testing. (These procedures can be adapted to the support operations).

    b.   Configuration management procedures and their relationship to the configuration management plan.

    c.   Guidelines for ensuring the growth potential, modularity, and ease of modification of the computer program.

    d.   Requirements for training in the production and deployment phase.

    e.   Computer resources product assurance plans including policies, procedures, and tasks for life cycle quality assessment of computer resources.

3.2.6.4   Section 5 - Coordinated Test Program Management

This summary of the overall test management effort is prepared by the Test Integrated Working Group during the demonstration and validation phase. The following topics shall be included:

    a.   Responsibilities and relationships among all parties involved in computer program test and evaluation, including the post-deployment support activity.

    b.   Computer program error reporting and correction.

c.   Schedules for acquisition of test tools and facilities.

d.   Test schedules.

3.2.6.5 Section 6 - Plan for Support

This section is prepared during the demonstration and validation phase and is updated in the subsequent phases. The following topics shall be included:

a.   Organizational relationships and responsibilities for management and technical support of computer resources.

b.   Assignment of configuration control responsibilities.

c.   Requirements for computer program documentation.

d.   Requirements for personnel, training, support hardware and software, and facilities.

e.   Plans for acquisition and operation of the support facilities.

f.   Funding and scheduling.

g.   Provisions for transition of program management responsibility and turnover of computer software.

3.2.7 <u>Post-Deployment Software Support (PDSS) Plan</u>

No existing formal policy in the Army or DARCOM requires a PDSS plan separate from Section VI of the CRMP. However, the revised draft of the "Post-Deployment Software Support (PDSS) Study/Management Plan" recommends requiring a PDSS Plan as a prerequisite for entry into full-scale engineering development, and provides a sample plan (developed for the Position Locating and Reporting System). Figure 3.2-1 is an outline of the plan. This plan is a detailed expansion of the portions of Section 6 of the CRMP that deal with software

1. INTRODUCTION
    1.1   PURPOSE
    1.2   SCOPE
    1.3   ASSUMPTIONS

2. IMPLEMENTATION PLANS AND AGREEMENTS
    2.1   INTERSERVICE SUPPORT AGREEMENT
    2.2   HOST-TENANT AGREEMENT
    2.3   PLRS SOFTWARE SUPPORT AND DEVELOPMENT
           ACTIVITY MANAGEMENT AND OPERATIONS PLAN
    2.4   SUPPORT CONTRACTORS' PROCUREMENT PLAN
           AND STATEMENTS OF WORK
    2.5   PLRS SOFTWARE QUALITY ASSURANCE PLAN
    2.6   CONFIGURATION MANAGEMENT AND CONTROL PLAN
    2.7   FISCAL SUPPORT PLAN
    2.8   LOGISTICS SOFTWARE SUPPORT PLAN

3. SOFTWARE SUPPORT CONCEPT
    3.1   RESPONSIBILITIES
    3.2   REQUIREMENTS

4. PLRS POST DEPLOYMENT SOFTWARE SUPPORT
    4.1   ORGANIZATIONAL CONCEPT
    4.2   SOFTWARE SUPPORT TASKS AND RESPONSIBLE
           ACTIVITIES

5. SCHEDULE
    5.1   ORGANIZATIONAL CONCEPT
    5.2   SOFTWARE SUPPORT TASKS AND RESPONSIBLE
           ORGANIZATIONS

6. PROCEDURES FOR ACCOMPLISHING SOFTWARE SUPPORT
    TASKS
    6.1   SYSTEM CHANGES
    6.2   ERROR CORRECTION
    6.3   SYSTEM IMPROVEMENTS
    6.4   NEW REQUIREMENTS
    6.5   SOFTWARE ERROR REPORTING PROCEDURES
    6.6   DOCTRINE CHANGES

7. LOGISTICS
    7.1   DISTRIBUTION OF NEW SOFTWARE VERSIONS

8. TESTING
    8.1   INTEGRATION TESTING
    8.2   VERIFICATION TESTING
    8.3   EVALUATION TESTING

9. SOFTWARE STRUCTURE CONCEPT
    9.1   SUPPORT SOFTWARE
    9.2   OPERATIONAL SOFTWARE

10. DOCUMENTATION CONCEPT
    10.1   EXTERNAL DOCUMENTATION LIBRARY
    10.2   PROGRAM LIBRARY
    10.3   TEST LIBRARY
    10.4   DOCUMENTATION MAINTENANCE

11. STANDARDS
    11.1   DOCUMENTATION STANDARDS
    11.2   PROGRAM STANDARDS
    11.3   TEST STANDARDS
    11.4   STANDARDS MAINTENANCE

12. ESTIMATES
    12.1   EQUIPMENT
    12.2   PERSONNEL
    12.3   LOCATION
    12.4   FACILITIES
    12.5   BUDGET ESTIMATE

Figure 3.2-1.   Outline of PLRS-Post Deployment Software Support Plan

support. It also supports a portion of the Integrated Logistic Support Plan
(AR 100-127). The purpose of including the emphasis on PDSS in this standard
is to ensure the readiness of MSSC to receive the transitioned responsibilities
and the software products that are turned over to MSSC in the transition
process.

3.2.8 Transition Plan

Policy, procedures, and guidance for the development of a transition plan are
provided in DARCOM-R 11-16 and DARCOM-R 70-1. Although those regulations
specifically address the transfer of management responsibilities from a
research and development command to a materiel readiness command, their
principles can be applied to the transfer of software support responsibilities
from the developer to the MSSC. On the other hand, specific guidance for the
turnover of software products is not provided in those regulations. Therefore,
the contents of the plan will vary from that in DARCOM-R 70-1 to include
turnover plans.

The transition plan will be developed during the full-scale development
phase. The basis for the plan will be found in the Letter of Instruction,
the Development Plan, and the Computer Resources Management Plan, which
reflect transition and post-deployment support planning actions that started
in the exploration of the alternative systems concepts phase. The plan will
be developed by the Transition Planning and Tracking Group, (PTG) if established.
For those cases where no PTG is established, development and coordination of
the plan will be as directed by the materiel developer. The following items
provide brief descriptions of the sections of the transition plan:

    a. Section I - General. State the purpose of the plan and describe the
items involved. Refer to Figures 3.2-2 and 3.2-3 for a description of a
general software system and software end product (Post-Deployment Software
Support (PDSS) Study/Management Plan).
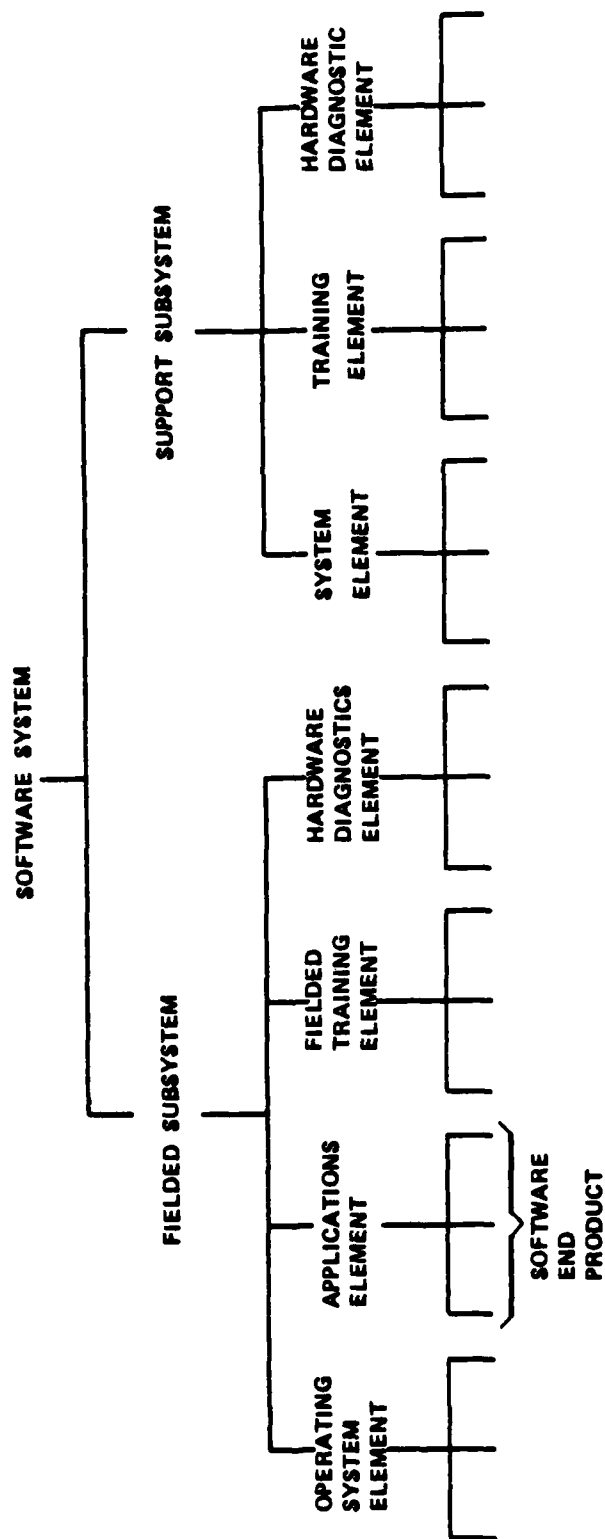
Figure 3.2-2. Generalized Software System

SOFTWARE ELEMENT

EXTERNAL   COMPUTER   COMPUTER
DOCUMENTATION   PROGRAM   TEST
LIBRARY   LIBRARY   LIBRARY

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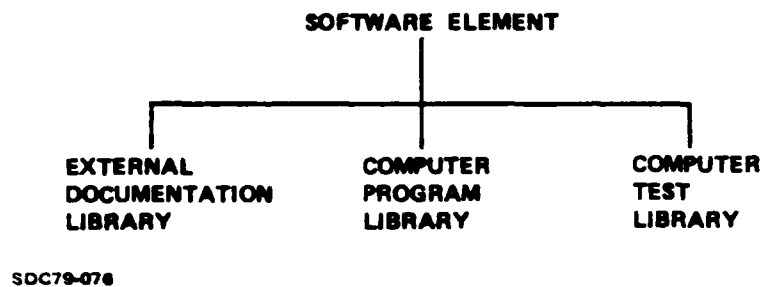
Figure 3.2-3.   Software End Product

b.   Section II - Requirements. Include the following topics:

(1) Documentation and Records. Describe the specific administrative documentation and records needed to manage the transition and turnover process. Delineate the responsibilities of each party to the transition with respect to these administrative items.

(2) Configuration Management (CM). Describe the specific configuration management responsibilities of each party before and after the transition and their relationship to the CM Plan. Describe the procedures for transferring the CM responsibilities, and the necessary CM documentation. Include the plans for maintaining control of computer programs and data during turnover.

(3) Engineering Responsibility. Describe the engineering functions to be provided by all parties before and after the transition. Include flow of ECP processing before and after transition.

(4) Engineering Data and Technical Data Package (TDP). Describe the items that are to be exchanged, and the responsibilities of all parties before and after transition. Provide checklists. Refer to Figures 3.2-4, 3.2-5, and 3.2-6 for the components of the general software end product. It is assumed that the system description is a system specification, the subsystem description is a computer program development specification, and the program description is a computer program product specification. Describe requirements for validation of these products prior to turnover, and maintenance after turnover.

(5) Logistic Support. Include in this area a summary of the software support concept from Section VI of the CRMP, including responsibilities of the parties before and after transition. Include support for computer hardware at MSSC.
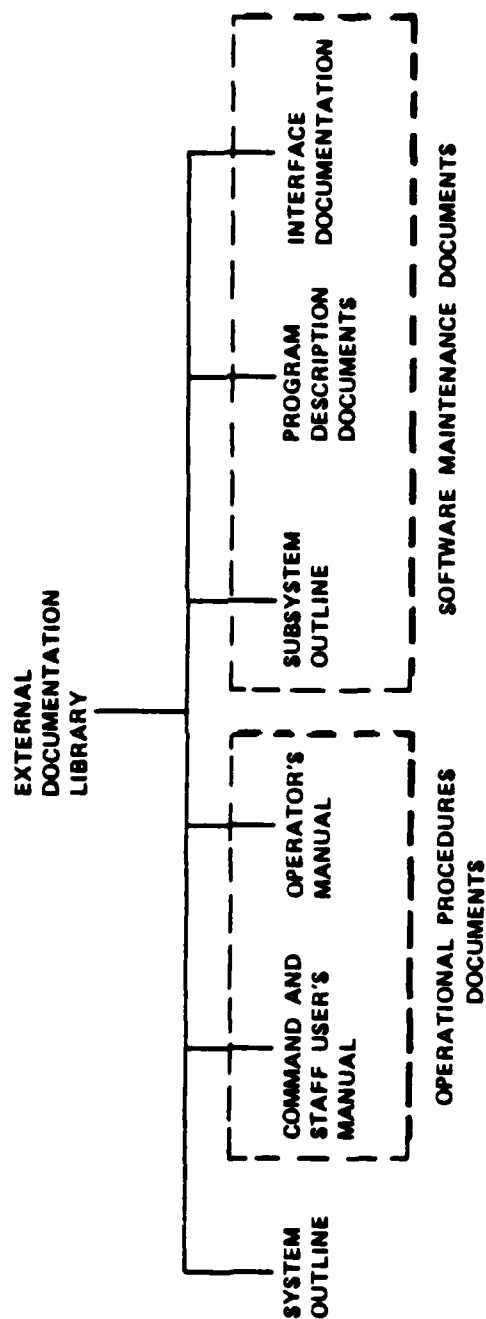
Figure 3.2-4.   External Documentation Library

```
                                    COMPUTER
                                    PROGRAM
                                    LIBRARY
                                        |
                    ┌───────────────────┴───────────────────┐
            COMPUTER PROGRAMS                          COMPUTER
            AND DATA (CARDS,                           PROGRAM
            TAPES, ETC.)                               LISTINGS

        SDC79-078
```
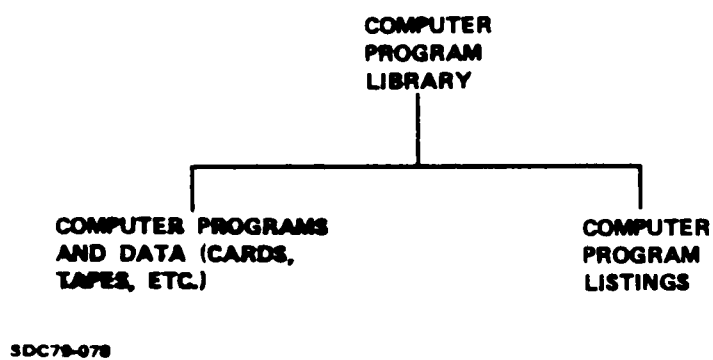
Figure 3.2-5.   Computer Program Library

```
                              COMPUTER
                              TEST
                              LIBRARY
                                 |
        _____|_____
       |                        |                         |
  COMPUTER                 COMPUTER                  COMPUTER
  TEST                     TEST                      TEST
  DATA                     PROGRAMS                  DOCUMENTATION
                                                        |
                                              _____|_____
                                             |                     |
                                        COMPUTER              COMPUTER
                                        TEST                  TEST
                                        PROCEDURES            RESULTS
```
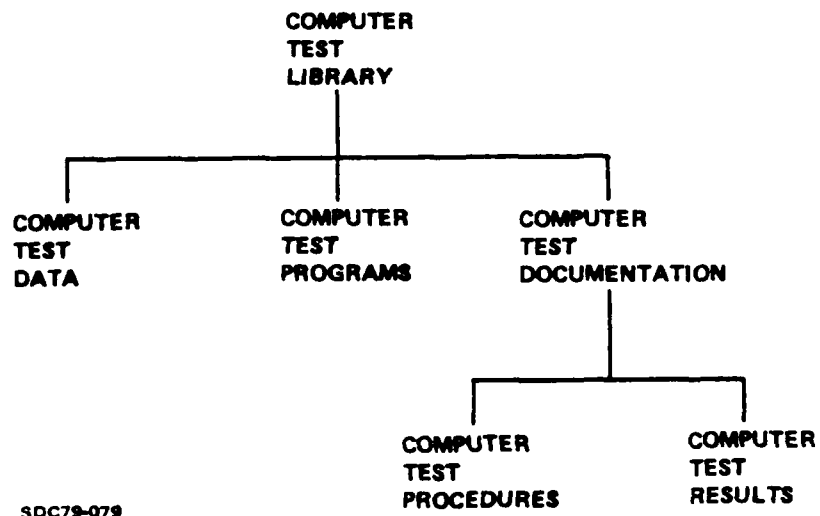
SDC79-079

Figure 3.2-6.   Computer Test Library

(6) Software Turnover. Describe requirements for turnover and acceptance of the software products and documentation.

(7) Budgeting and Funding Summary. Describe the budgeting and funding responsibilities and sources by function before and after transition. Include responsibilities for support facilities, equipment, personnel, training, and computer programs required before transition, and software modifications, promulgation of changes, distribution of new versions, and operation and maintenance of support center after transition.

(8) Procurement. Plans and responsibilities for continuing software procurement actions, status of contracts, contract monitors, DD 254 actions.

(9) Product Assurance. Plans for transfer of Quality, Reliability and Maintainability program re ponsibilities. Discuss reports required by MSSC for RAM data collection.

(10) Milestone Schedules. Schedule the transition process in sufficient detail to provide visibility for the PTG and other managers. Provide dates for delivery of software products. The date of transition of management responsibilities shall be set by the PTG and shall be the earliest practical date that allows managers with pending responsibilities sufficient time to incorporate these into the next Planning, Programming, and Budgeting System cycle. Twelve criteria for selection of the transition date are given in DARCOM-R 70-1.

c. Section III - Agreements and Commitments. The developer shall provide the details of all agreements and commitments made during development that need to be known by MSSC. This section will also record all agreements between the parties to the transition.

d. Section IV - Resources. Summarize requirements for personnel, facilities, computer resources, and telecommunications to accomplish the

transition, turnover, and post-deployment software support. Identify training
needed to qualify personnel. Ensure that lead times for each item are known
and accounted for in milestone schedules.

3.2.9 Configuration Management Plan (CMP)

A CMP is required to be prepared as one of the actions to establish the
functional baseline (AR 70-37 DARCOM SUPP 1, MIRADCOM SUPP 1(J)). After
approval, the CMP is to be reviewed annually throughout the system life
cycle. The referenced regulation describes the contents of the CMP in detail.
The required format is as follows:

Section 1.   Introduction
            1.1 Description of the CI

            1.2 CI Status

            1.3 Special Features

Section 2.   Organization
            2.1 Responsibilities

            2.2 Structure

            2.3 Policy Directives

Section 3.   Baseline Identification
            3.1 Engineering Release Record (ERR)

            3.2 Functional Baseline

            3.3 Allocated Baseline

            3.4 Product Baseline

            3.5 CM Audits

Section 4.   Configuration Changes
            4.1 Selection of Options

            4.2 Procedures

            4.3 Interface Control

Section 5.   Status Accounting
         5.1 Data Bank Location
         5.2 Data Bank Content
         5.3 Reporting
         5.4 Follow-on Audits

Upon its initiation during the exploration of alternative system concepts
phase, the CMP is to include provisions for post-deployment software support
and change control (DARCOM-C 702-4). These provisions are to be updated and
expanded as necessary throughout the life cycle. The configuration management
process for the production and operational phases is shown in Figure 3.2-7.
The CMP is supported by the CRMP (DARCOM-R 70-16).

3.2.10 Funding
The requirements for planning for the funds to develop, acquire, install,
check out, staff, and operate a PDSS center are discussed in the life cycle
management sections of this standard (3.2.1 through 3.2.5) and in the CRMP,
PDSS Plan, and Transition Plan. Guidance for financing research, development,
test, and evaluation programs and instructions for reprogramming funds are in
AR 70-6 and AR 37-112. The PM has obligational authority for program/project
funds (AR 70-17). It is his responsibility to ensure that the budgets prepared
and reviewed by DARCOM major subordinate commands and HQ, DARCOM include
RDTE, Procurement Appropriation Army (PAA), Operation and Maintenance Army
(OMA), and Military Construction Army (MCA) budget requirements to support
his mission. The supporting activity will provide the PM with the funds
allocated by HQ DARCOM for PM use (DARCOM-R 11-16). Details of funding for
tests are in AR 70-10 and AR 37-100-XX. The PDSS Study/Management Plan
reports funding of software error corrections by OMA, system improvement
changes funded by Procurement of Equipment Missiles Army (PEMA) under a
product improvement program (PIP), and major changes funded by RDTE under a
PIP. Initial funding of a PDSS center and its personnel is under OMA, direct
from DA. Plans shall indicate responsibilities for programming and budgeting
with estimates provided by MSSC and the PM.
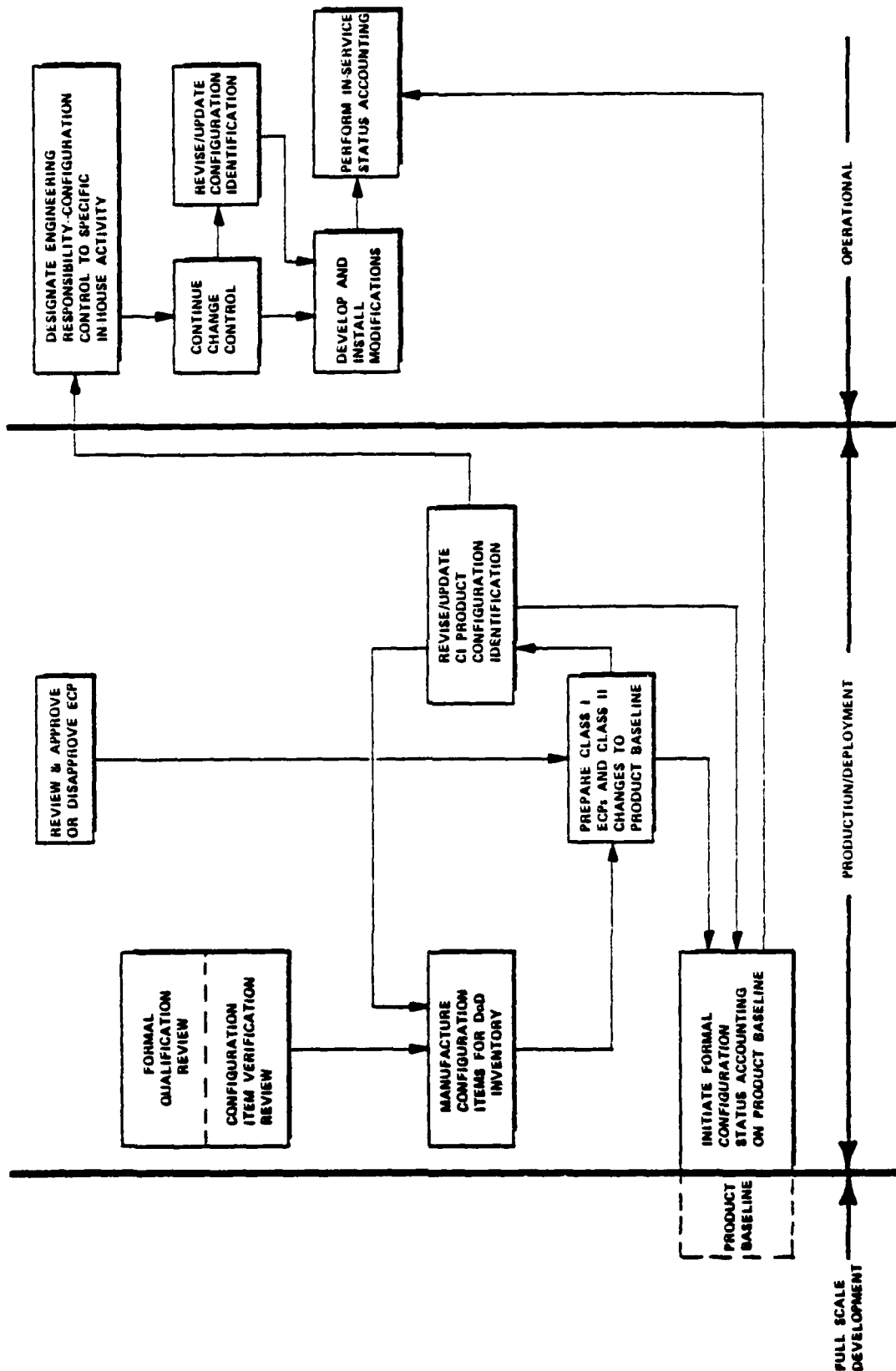
Figure 3.2-7. CM in Production/Deployment and Operational Phases

3.3 TRANSITION PROCESS

This section presents the activities required of the MSSC to implement the plans and accomplish turnover of computer software products, transition of software management responsibilities, and commencement of post-deployment software support. Because of the long-term planning required to set up a PDSS center, some repetition of items from section 3.2 will occur. It is assumed that all planning milestones have been achieved and passed.

3.3.1 Coordination

Thirty days prior to the date of the first delivery of computer programs, review the memoranda of understanding with the materiel developer, PM, the combat developer, and any others to ensure that all provisions remain feasible and that all parties are in agreement. Review PDSS Plan, CRMP, CMP and Transition Plan. Test coordinated MSSC operations.

3.3.2 Funding

Review budget with the PM. Track financial plan through next programming cycle to ensure coverage. Take action necessary to adjust funds or costs.

3.3.3 Manning and Training

Programming for spaces, recruiting, and assignment of personnel for post-deployment support may be necessary up to 2 years before transition date to ensure that training opportunities are not missed. Take manpower acquisition actions as scheduled. Acquire spaces at appropriate schools and courses. Facilitate preplanned contractor-supplied training with an on-site training team at MSSC.

3.3.4 Support System Turnover

The support system shall consist of the support computer - either one developed and supplied as part of the weapon system to be supported, or a general purpose commercial computer that exists in or is acquired for the post deployment support center - with a support software subsystem comprising the weapon system support software, commercial software and MSSC software tools. This paragraph addresses the weapon system products separately from the commercial products.

3.3.4.1 Commercial Computer Resources

The existing computer resources in MSSC shall be used to meet the post-deployment software support requirements, if possible. If additional resources were found necessary in the planning phase, documented justification for procurement shall have been submitted through the Missile Command early enough to be ready before turnover of any missile support subsystem software. Acquisition of the resources by MICOM will be in accordance with DODD 4105.55, 4160.19 and 5100.40. The following steps shall be taken by MSSC to complete the commercial computer resources portion of the support center:

 a. Coordinate an agreement with MICOM and the vendor for acceptance tests to be conducted.

 b. Prepare the site for computer installation; e.g., arrange for additional space, raised floor, electrical power, environmental control, lighting as needed.

 c. Monitor installation of computer resources.

 d. Conduct acceptance tests.

 e. Inventory software products; i.e., computer programs, descriptions, programmers references, user references, operator's references.

 f. Document maintenance arrangements.

 g. Document acceptance.

3.3.4.2 Tactical Support Subsystem Turnover

3.3.4.2.1 Hardware. If the planning has included provisions for tactical support hardware (production or prototype) to be supplied to the center, the following steps shall be taken by MSSC:

a.   Prepare a site for the tactical support equipment, considering
special power requirements, access and security problems if the equipment is
shelterized, and potential environmental impacts, especially noise, from
self-contained environmental control units and power generating units.

b.   Arrange for installation and checkout, adapting the procedures
used for delivery to any other user; e.g., the materiel fielding plan in
the CRMP.

c.   Obtain certified documentation for operation and maintenance,
including unentered changes.

d.   Obtain a list of equipment modifications and their status with
respect to the item supplied.

e.   Document maintenance agreements not provided for in the planning
subsection or in the coordination paragraph (3.3.1).

f.   Document acceptance.

3.3.4.2.2 Software. The tactical support subsystem software shall be installed
and accepted in the following manner (it is assumed that the support software
has been specified as a deliverable configuration item(s)):

a.   When possible MSSC personnel shall attend the FCA and PCA,
as part of the process of accepting the support subsystem software. Other-
wise, records of FCA and PCA shall be obtained and reviewed.

b.   Arrange with the Configuration Manager and PM for a temporary
freeze on approval of changes to the support software configuration, during
which time all approved changes will be implemented.

c.   Perform an audit to define the current baseline using FCA, PCA,
and Configuration Management records.

d. Move the frozen baseline computer program configuration item
(that is, the software end products for the support subsystem as shown in
Figures 3.2-3 and 3.2-4) to MSSC. This will include the following to
the extent they were contractually required:

(1) The current qualified master copy and listing of the current
fielded version and its version description document.

(2) The computer program product specification with all effective
specification change notices.

(3) Computer program development specification with all effective
specification change notices.

(4) Certified user's manuals, and operating instructions, updated
with all effective changes.

(5) Test plans and procedures

(6) Test reports from Formal Qualification Tests.

e. Install on support computer and conduct demonstration.

f. Document acceptance of baseline support software.

g. Establish a software change control function, including adminis-
trative capabilities to receive, record, control, and account for trouble
reports and to promulgate changes.

h. Obtain all outstanding software trouble reports and approved
ECPs, documentation of their status, copies of test versions, listings, and
version description documents.

i. Document completion of turnover for support software.

3.3.5 Fielded System Turnover

The fielded system for the purposes of this standard shall consist of those portions of the tactical system that contain the embedded computer resources, plus other portions necessary to constitute an operating set of equipment suitable for use in the MSSC's *post deployment software* support mission. The MSSC may be supporting all or only portions of the fielded subsystem software. This will determine what specific items are delivered to MSSC. Regardless of what portions are supplied, the turnover process for the *fielded system is the same as for the* support system, and MSSC shall perform the same steps (3.3.4.2), reading "fielded" wherever "support" appears.

3.3.6 Transition of Configuration Management

The Configuration Management Plan, CRMP, Transition Plan, Letter of Instruction, and memoranda of understanding define the configuration management functions to be performed by MSSC. To implement those plans, MSSC shall take the following steps, as required (this paragraph assumes that the responsibilities for all software configuration management functions have been assigned to the MSSC, along with the chair of the Software Configuration Control Board (CCB)):

a.   Establish and chair the Software Configuration Control Board. Promulgate instructions for its operation.

b.   Establish lines of communication to the Configuration Control Board, and obtain and become familiar with its operating procedures.

c.   Make facilities and support ready for the software configuration control function—that is office space, telecommunications, library space, and automated CM tools, if applicable.

d.   Concurrent with the freeze for turnover of software (3.3.4 and 3.3.5), move the software configuration management records to the MSSC. This includes:

(1) Configuration identification -- functional baseline, allocated baseline, and product baseline with all approved ECPs and specification change notices (SCN); operators manual and users manual with approved changes; test plans, procedures, and reports.

(2) Configuration status accounting data -- status of all proposed changes to the configuration, status of implementation of approved changes, requests for waivers and deviations, version description documents, and configuration index.

(3) Configuration control records -- minutes of SCCB, SCCB and CCB decisions, records of audits.

e.   When all records and procedures are in place, including the software change control function, report transition complete.

3.3.7 Commencement of Post-Deployment Software Support (PDSS)

The procedures for the conduct of PDSS are not within the scope of this standard. However, this paragraph is included to emphasize the proper prerequisites for the PDSS function. Upon completion of the turnover and transition planning and procedures described herein, MSSC shall commence PDSS, successfully.

4. RESPONSIBILITIES

This section assigns responsibilities to MSSC managers for the maintenance and execution of this standard. The assignments are shown in Table 4-1, and are summarized functionally for each manager in the following subsections.

4.1 DIRECTOR, MSSC

The director shall be responsible for the total content and overall execution of this standard. He shall be responsible for executing all requirements dealing with the MSSC as a whole, with personnel or training matters, or requiring coordinated action by two or more MSSC managers.

4.2 CHIEF, SYSTEM ANALYSIS

The Chief, System Analysis, shall be responsible for executing designated requirements in the standard that deal with the need for configuration identification baselines, computer resource requirements, or support to the PM in the preparation of program management documents.

4.3 CHIEF, COMPUTER HARDWARE ENGINEERING

The Chief, Computer Hardware Engineering, shall be responsible for executing designated requirements in the standard that deal with commercial support computer resources, fielded computer hardware, or maintenance and diagnostics hardware and software.

4.4 CHIEF, SOFTWARE ENGINEERING

The Chief, Software Engineering, shall be responsible for executing designated requirements in the standard that deal with the transition plan, PDSS plan, turnover of tactical software, software configuration control, software error reporting and control, software product assurance and software design.

4.5 CHIEF, VERIFICATION AND VALIDATION (V&V)

The Chief, V&V, shall be responsible for executing designated requirements in the standard dealing with the Coordinated Test Program, software testing, validation of computer resource documents, audits, the Computer Resources Working Group, the Computer Resources Management Plan, and the design of software test tools.

Table 4-1. Responsibilities (Sheet 1 of 3)

KEY:

M - MAINTAIN   E - EXECUTE   C - CONTRIBUTE

	PROJECT LEADERS	DIRECTOR	SYSTEMS	HARDWARE	SOFTWARE	V&V	FACILITIES
1. INTRODUCTION		M					
1.1 PURPOSE		M					
1.2 SCOPE		M					
1.3 MSSC ORGANIZATION		M					
1.3.1 MISSION		M					
1.3.2 ORGANIZATIONAL FUNCTIONS		M					
1.3.2.1 DIRECTOR FUNCTIONS		M					
1.3.2.2 SYSTEM ANALYSIS FUNCTIONAL AREA			M				
1.3.2.3 COMPUTER HARDWARE ENGINEERING FUNCTIONAL AREA				M			
1.3.2.4 SOFTWARE ENGINEERING FUNCTIONAL AREA					M		
1.3.2.5 VERIFICATION AND VALIDATION FUNCTIONAL AREA						M	
1.3.2.6 COMMON FUNCTIONS		M					
1.4 MSSC RESOURCES							M
1.4.1 PERSONNEL							M
1.4.2 COMPUTERS							M
1.4.3 SUPPORT SOFTWARE							M
1.4.4 FACILITIES							M
2. APPLICABLE DOCUMENTS		M					
3. REQUIREMENTS		M					
3.1 ASSIGNMENT OF SOFTWARE SUPPORT RESPONSIBILITIES		M/E					
3.2 PLANNING			M				
3.2.1 MILESTONE O - EXPLORATION OF ALTERNATIVE SYSTEM CONCEPTS	M						
3.2.1.1 PROGRAM MANAGEMENT ACTIONS	M						
3.2.1.2 MSSC ACTIONS			M				
a. NEW MISSILE PROGRAMS		E					
b. DARCOM LIAISON	E						
c. INITIAL TRANSITION PLANS					E		
d. PM LIAISON	E						
e. MSSC RO...	E						
f. FUNCTIONAL CONFIGURATION IDENTIFICATION			E				
g. COORDINATED TEST PLAN (CTP)						E	
h. DEFENSE COORDINATING PAPER (DCP)			E				
3.2.2 MILESTONE I - DEMONSTRATION AND VALIDATION	M						
3.2.2.1 PROGRAM MANAGEMENT ACTIONS	M						
3.2.2.2 MSSC ACTIONS					M		
a. SUPPORT AGREEMENTS	E						
b. CRWG						E	
c. CRMP						E	
d. OUTLINE DEVELOPMENT PLAN (ODP)			E				
e. CTP						E	
f. PM LIAISON	E						
g. PDSS PLAN					E		
h. CONFIGURATION MANAGEMENT PLAN (CMP)					E		
i. CTP						E	
j. ALLOCATED CONFIGURATION IDENTIFICATION			E				
k. CRMP						E	
l. DCP			E				
3.2.3 MILESTONE II - FULL SCALE ENGINEERING DEVELOPMENT	M						
3.2.3.1 PROGRAM MANAGEMENT ACTIONS	M						
3.2.3.2 MSSC ACTIONS					M		
a. TRANSITION PLANNING AND TRACKING GROUP (PTG)					E		
b. TRANSITION PLAN					E		
c. MSSC REQUIREMENTS			E				
d. SUPPORT AGREEMENTS	E						
e. CTP						E	
f. DEVELOPMENT PLAN (DP)			E				
g. VALIDATION						E	
h. CONFIGURATION AUDITS						E	
i. PRODUCT CONFIGURATION IDENTIFICATION			E				
j. TRANSITION PLAN					E		
k. CRMP						E	

Table 4-1.   Responsibilities (Sheet 2 of 3)

KEY:

M - MAINTAIN   E - EXECUTE   C - CONTRIBUTE

		PROJECT LEADERS	DIRECTOR	SYSTEMS	HARDWARE	SOFTWARE	V&V	FACILITIES
	l. DP			E				
	m. DCP			E				
	n. TRANSITION		E					
3.2.4	MILESTONE III - PRODUCTION	M						
3.2.4.1	PROGRAM MANAGEMENT ACTIONS	M						
3.2.4.2	MSSC ACTIONS				M			
	a. TRANSITION PLAN					E		
	b. CTP						E	
	c. DP			E				
	d. PDSS PLAN					E		
	e. PDSS CENTER RESOURCES		E					
	f. FCA, PCA						E	
	g. DP, DCP			E				
	h. TRANSITION		E					
	i. TRAINING PLANS		E					
	j. TRAINING		E					
	k. ACCEPTANCE TESTS						E	
	l. MSSC READINESS		E					
3.2.5	OPERATIONAL PHASE	M						
3.2.5.1	PROGRAM MANAGEMENT ACTIONS	M						
3.2.5.2	MSSC ACTIONS	M	E					
3.2.6	COMPUTER RESOURCES MANAGEMENT PLAN (CRMP)						M/E	
3.2.6.1	SECTION 2 - PROGRAM MANAGEMENT	E						
	a. SUPPORT REQUIREMENTS			C				
	b. SOFTWARE MAINTENANCE					C		
	c. SUPPORT EQUIPMENT				C			
	d. RESOURCE REQUIREMENTS			C				
3.2.6.2	SECTION 3 - ACQUISITION MANAGEMENT					E		
	a. SUPPORT PLANS	C						
	b. SUPPORT CONCEPT					C		
	c. DOCUMENTATION						C	
	d. FACILITY REQUIREMENTS			C				
	e. CM CONCEPTS					C		
	f. TRANSITION CRITERIA					C		
3.2.6.3	SECTION 4 - DEVELOPMENT MANAGEMENT					E		
	a. ERROR REPORTING					C		
	b. CM PROCEDURES					C		
	c. SOFTWARE DESIGN					C		
	d. TRAINING			C				
	e. PRODUCT ASSURANCE					C		
3.2.6.4	SECTION 5 - COORDINATED TEST PROGRAM MANAGEMENT						E	
	a. TEST RESPONSIBILITIES						C	
	b. ERROR REPORTING					C		
	c. TEST TOOLS						C	
	d. TEST SCHEDULES						C	
3.2.6.5	SECTION 6 - PLAN FOR SUPPORT	E						
	a. ORGANIZATION	C						
	b. CONFIGURATION CONTROL	?						
	c. DOCUMENTATION			C				
	d. PDSS REQUIREMENTS		C	C				
	e. SUPPORT FACILITIES							C
	f. FUNDING	C						C
	g. TRANSITION					C		
3.2.7	POST DEPLOYMENT SOFTWARE SUPPORT (PDSS) PLAN					M		
3.2.8	TRANSITION PLAN					M		
	a. SECTION I - GENERAL					E		
	b. SECTION II - REQUIREMENTS					E		
	(1) DOCUMENTATION AND RECORDS	C						
	(2) CM	C						
	(3) ENGINEERING RESPONSIBILITY	C						
	(4) TECHNICAL DATA						C	

Table 4-1. Responsibilities (Sheet 3 of 3)

KEY:

M - MAINTAIN   E - EXECUTE   C - CONTRIBUTE

		PROJECT LEADERS	DIRECTOR	SYSTEMS	HARDWARE	SOFTWARE	V&V	FACILITIES
	(5) LOGISTIC SUPPORT					C		
	(6) TURNOVER					C		
	(7) BUDGETING	C						
	(8) PROCUREMENT	C						
	(9) PRODUCT ASSURANCE					C		
	(10) MILESTONES	C						
	c. SECTION III - AGREEMENTS AND COMMITMENTS	E						
	d. SECTION IV - RESOURCES		E					
3.2.9	CONFIGURATION MANAGEMENT PLAN (CMP)					M/E		
3.2.10	FUNDING	M/E						
3.3	TRANSITION PROCESS					M		
3.3.1	COORDINATION	M/E						
3.3.2	FUNDING	M/E						
3.3.3	MANNING AND TRAINING				M/E			
3.3.4	SUPPORT SYSTEM TURNOVER					M		
3.3.4.1	COMMERCIAL COMPUTER RESOURCES					E		
	a. ACCEPTANCE TEST PLAN					E		
	b. SITE PREPARATION							E
	c. MONITOR INSTALLATION					E		
	d. ACCEPTANCE TEST					E		
	e. DOCUMENTATION						E	
	f. DOCUMENT MAINTENANCE					E		
	g. DOCUMENT ACCEPTANCE					E M		
3.3.4.2	TACTICAL SUPPORT SUBSYSTEM TURNOVER					M/E		
3.3.4.2.1	HARDWARE							
	a. SITE PREPARATION							E
	b. INSTALLATION				E			
	c. DOCUMENTATION						E	
	d. CHANGE STATUS						E	
	e. MAINTENANCE				E			
	f. ACCEPTANCE				E			
3.3.4.2.2	SOFTWARE					M/E		
	a. FCA/PCA						E	
	b. CM FREEZE	E					E	
	c. AUDIT						E	
	d. TRANSFER SOFTWARE	E						
	e. INSTALL SOFTWARE					E		
	f. ACCEPT SOFTWARE					E		
	g. CHANGE CONTROL					E		
	h. CHANGE REQUESTS					E		
	i. TURNOVER COMPLETE					M		
3.3.5	FIELDED SYSTEM TURNOVER*							
	HARDWARE				E			
	SOFTWARE					E		
3.3.6	TRANSITION OF CONFIGURATION MANAGEMENT					M/E		
	a. SCCB		E					
	b. CCB		E					
	c. MSSC READY		E					
	d. CM RECORDS	E						
	e. TRANSITION COMPLETE					E		
3.3.7	COMMENCEMENT OF POST DEPLOYMENT SOFTWARE SUPPORT (PDSS)		M/E					

*ACTIVITY IN 3.3.5 IS STRUCTURED SAME AS IN 3.3.4.2 WITH SAME RESPONSIBILITIES (3.3.5)

4.6 CHIEF, FACILITIES AND OPERATIONS

The Chief, Facilities and Operations, shall be responsible for executing designated requirements of the standard that deal with facilities requirements and site preparation.

4.7 PROJECT LEADERS

Project Leaders as a group shall be responsible for executing designated requirements for liaison with DARCOM staff, materiel developer, or PM; support agreements and memoranda of understanding; and funding. Assignments to specific project leaders shall be made by the director.

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